

VARIABLE INFORMATION SIGN

FIELD OF THE INVENTION

This invention generally relates to display apparatus and more particularly to a billboard-type sign for displaying variable information.

BACKGROUND OF THE INVENTION

Electrical and mechanical billboard-type signs have come into widespread use in sporting arenas, on buildings, and in other applications in which it is desired to provide a relatively large display of variable information. The great majority of such signs include a display surface having a background portion in which is located a plurality of incremental display positions or "pixel" locations. By selectively controlling the contrast of the pixel locations with respect to the background portion of the display surface, variable information such as alphanumeric characters, messages formed from such characters, and graphics can be displayed.

An electrical billboard-type sign in common use includes a plurality of incandescent lamps at the pixel locations that are selectively energized in accordance with the information to be displayed. In order to provide sufficient contrast and therefore display visibility under high ambient light conditions, each incandescent lamp typically has a wattage in the range of 60-100 watts. Although the number of incandescent lamps used in such an electrical sign varies with the size of the sign and the desired resolution of the display, it is apparent that such a sign has a relatively high energy consumption. For example, one such sign used for the Montreal Olympics has 76,800 incandescent lamps with a resultant nominal energy consumption in the megawatt range. The incandescent lamps are also subject to frequent failure, thereby necessitating frequent and expensive maintenance, and the selective energization of the lamps is controlled by very complex and therefore very expensive circuitry.

In another type of electrical billboard-type sign, the display surface is formed by a screen having a plurality of apertures at the pixel locations. Behind the screen are located a plurality of continuously energized fluorescent lamps. Each aperture in the screen has associated therewith a shutter which can be moved to either cover or uncover the aperture, and a shutter-actuating mechanism is provided which moves behind the screen and which includes a plurality of magnets whose positions can be selectively controlled to selectively move the shutters in accordance with the information to be displayed. Although such an electrical sign can have significantly lower energy consumption and improved display resolution over signs using incandescent lamps, the contrast and therefore display visibility provided by the sign is very low so that the sign can be used only in low ambient light conditions. Further, proper and continued operation of the shutters and the shutter-actuating mechanism requires that very fine mechanical tolerances must be met and maintained.

A mechanical billboard-type sign in common use includes a plurality of multiple-sided display elements, such as blocks or discs, at the pixel locations. Each display element is individually mounted for rotation, and each side thereof has a contrasting surface. An actuating means, typically of mechanical or electromechanical construction, is provided for selectively rotating the display elements in accordance with the infor-

mation to be displayed. Although the display afforded by such a mechanical sign is visible under most ambient light conditions and although such a mechanical sign generally consumes less electrical energy than the electrical signs previously described, proper and continued operation of the mechanical sign requires that very fine tolerances be met and maintained for the display elements and the actuating means therefor. Because of the mechanical nature of and the fine tolerances required for the display elements and the actuating means, the mechanical sign is very expensive to construct and maintain and the resolution afforded by the display thereof is generally not sufficient to permit the display of graphics.

It is therefore an object of this invention to provide an improved billboard-type sign for displaying variable information.

It is another object of this invention to provide such a sign which consumes a relatively small amount of electrical energy when compared to the electrical energy consumed by previously known and used electrical signs.

It is yet another object of this invention to provide such a sign which includes a minimum number of components and which therefor is relatively inexpensive to construct when compared with previously known and used billboard-type signs.

It is still another object of this invention to provide such a sign which requires very little maintenance over extended periods of time.

It is a further object of this invention to provide such a sign whose display is visible under adverse ambient light conditions.

It is yet a further object of this invention to provide such a sign whose display resolution is sufficient to permit graphics to be displayed.

SUMMARY OF THE INVENTION

Briefly, the foregoing objects and other objects and advantages that will be apparent from the consideration of the entire specification are achieved in a variable information sign that comprises:

a display member having a smooth and substantially nonporous display surface;

a plurality of print modules disposed in proximity to the display member so as to face the display surface, with each print module including a pad of porous material containing a dry erase ink and being selectively actuable to bring the pad into contact with the display surface so as to print an image thereon;

erase means disposed in proximity to the display member so as to face the display surface, for wiping the display surface to remove any image thereon;

means for producing relative motion between the display member and the plurality of print modules and between the display member and the erase means, the plurality of print modules and the erase means being arranged so that upon such relative motion, any previously-printed images are first removed from the display surface by the erase means and an image of information desired to be displayed is thereafter formed on the display surface as the plurality of print modules are selectively actuated.

The display member may be stationary and the plurality of print modules and the erase means may be